been the target of claims of being an artifact. Two of the central figures in developing techniques for electron microscopy, Claude and Palade, joined the legacy of those arguing that it was artifact.[36] The case is ironic, because both researchers returned to work on the Golgi apparatus several years later, and Palade played a central role in revealing the function of the Golgi (see Chapter 6). But in 1949 they charged that it was an artifact of osmium fixation. The case they made is a model argument for demonstrating an artifact. Because the conclusion was ultimately rejected even by the authors, it reveals just how epistemologically difficult the evaluation of artifacts is.

In the first of their two papers, Palade and Claude (1949a) applied ethanol to homogenates created from a wide variety of cell types from several different species. They claimed it transformed lipid inclusions that occurred in the area where the Golgi apparatus was typically found into myelin figures. Such figures were known to be very polymorphic and unstable, an interesting property given the variable appearance of the Golgi apparatus. In cells, they argued, such myelin figures are not able "to expand freely, but were forced to adapt themselves to the spaces available between the masses of precipitated cytoplasm" (p. 44). Moreover, the appearance of the myelin figures varied with the concentration of ethanol. Under some conditions, their appearance was very similar to that of the Golgi apparatus: "For a certain range of ethanol concentrations, generally comprised between 40 and 55%, the morphology and topography of the intracellular myelin figures are surprisingly similar to those assumed by the Golgi apparatus in corresponding cells" (p. 49). Palade and Claude summarized their results with ethanol:

> Myelin figures can duplicate faithfully the numerous and different forms ascribed at various times to the Golgi apparatus. Thus they can take the appearance of massive, or canalicular networks, scattered strands, canaliculi, polymorphic bodies, "poly-systems" and "mono-systems". . . . These facts strongly suggest that the Golgi apparatus may be a myelin figure or a complex of myelin figures artificially induced in cells by given cytological techniques. Such a hypothesis could reconcile the different aspects presented by cells of the same time when examined in the fresh condition or after the application of recognized cytological procedures. (p. 52)

In normal preparations, however, ethanol is not introduced until after staining with osmium tetroxide or silver nitrate, at which point the Golgi apparatus

[36] According to Porter (Interview, 1987, University of Maryland, Baltimore County), Claude had become convinced that the Golgi apparatus was an artifact and initiated the project. Palade had recently been recruited into the laboratory by Claude and was drawn into the project of establishing that the Golgi apparatus was indeed an artifact.